Estimated Benefits and Costs of Compliance with Nutrient Criteria in Montana

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What This Study Addresses

- Estimated Benefits and costs of all entities affected in Montana by nutrient criteria
- Estimated values in this analysis are for compliance only
- It is assumed that nutrient criteria values are not reached
  - Affordability
  - LOT
- If criteria values were reached, costs would be greater and benefits would be greater than the results of this analysis

The Results

Benefits (annual)	Costs (annual)
Quantifiable	
est. < $7 million (Dodds et. al.)—Rec., drinking water, prop. Values	est. > $40 million $40 M for public sector WWTPs
Non-quantifiable	
+ Other economic benefits (agric, health, non-monetary)	+ Private sector costs (30-70 businesses)
+ Ecosystem benefits	+ Other costs (admin, transaction)
Benefits are long-term	At least 20 years

Benefits-Quantifiable

- Dodds Study- "Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages"
- Estimated the economic value of higher water quality as result of nutrient standards over current water quality for the entire U.S.
- Methods:
  - Compared current TN and TP concentrations for the U.S. EPA nutrient ecoregions with estimated reference conditions.
  - Calculated potential annual value losses in recreational water usage, waterfront real estate values, spending on recovery of threatened and endangered species, and drinking water
  - Values may be underestimated/research gaps

Values Estimated in Dodds

- Recreational Water Usage—Algal bloom effect on boating, fishing, other rec. loss of trip-related expenses
- Property values can decrease with declines in water clarity--data from 37 lakes in the Mississippi River headwaters region to calculate percent gain or loss in property values per 1 m change in Secchi depth.
- Biodiversity. assume 25% of all imperiled aquatic species are threatened in part by human-induced eutrophication and therefore 25% of all recovery costs of U.S. Federal Endangered Species Act plans

- Drinking water costs attributable to eutrophication were estimated using the amount of money spent on bottled water that could potentially be attributed to avoidance of taste and odor problems in surface-water-derived tap water
- Costs not measurable
  - number of days water bodies were closed for contact and noncontact use
  - number of fish kills
  - human and livestock deaths and sicknesses
  - money spent on watershed restoration and developing nutrient criteria
  - money spent on macrophyte removal
  - water treatments added by municipalities as a result of eutrophication
- Cost are probably conservative

Benefits-Quantifiable (Cont.)

- Estimated a value of $2.2 B annually for total U.S. costs from not meeting standards (or benefit of meeting standard)
- Prorated that number proportionately by population (0.31%) to come up with a Montana number-about $7 M in benefits
- < $7 M because not meeting standards
- Rec water usage ($3.2 M), Waterfront prop values ($1 M), endangered species ($0.15 M), and drinking water ($2.6 M)
- Could be more or less based on assumptions

Non Quantifiable Benefits- Anthropocentric

- Improved water quality for economic uses: Less treatment needed for incoming water into a business, industry or WWTP, tourism
- Improved Agricultural water supply (less clogging of irrigation canals, cattle)
- Increased Human Health
- Option Value and Existence value of cleaner water
- Aesthetics from meeting nutrient standards (wilderness, birdwatching, fishing experience)
- Some of these benefits could be minor, and may be partially captured in $7 M figure.

Non Quantifiable Benefits-Non Human

- Non-Human benefits including improved health of plants, riparian areas, wildlife, water and nutrient cycles
- Maintenance of dissolved oxygen levels suitable for aquatic life and fisheries
- Minimization of daily pH changes which can harm fisheries
- Maintenance of healthy aquatic life communities including more sensitive species (fish kills down, biodiversity up, macrophyhte growth).

Costs

- Public Sector (WWTPs) + private sector (30-70 businesses) + government costs + other costs
- Public sector was the only sector that we could quantify

Costs—Quantifiable: Public Sector

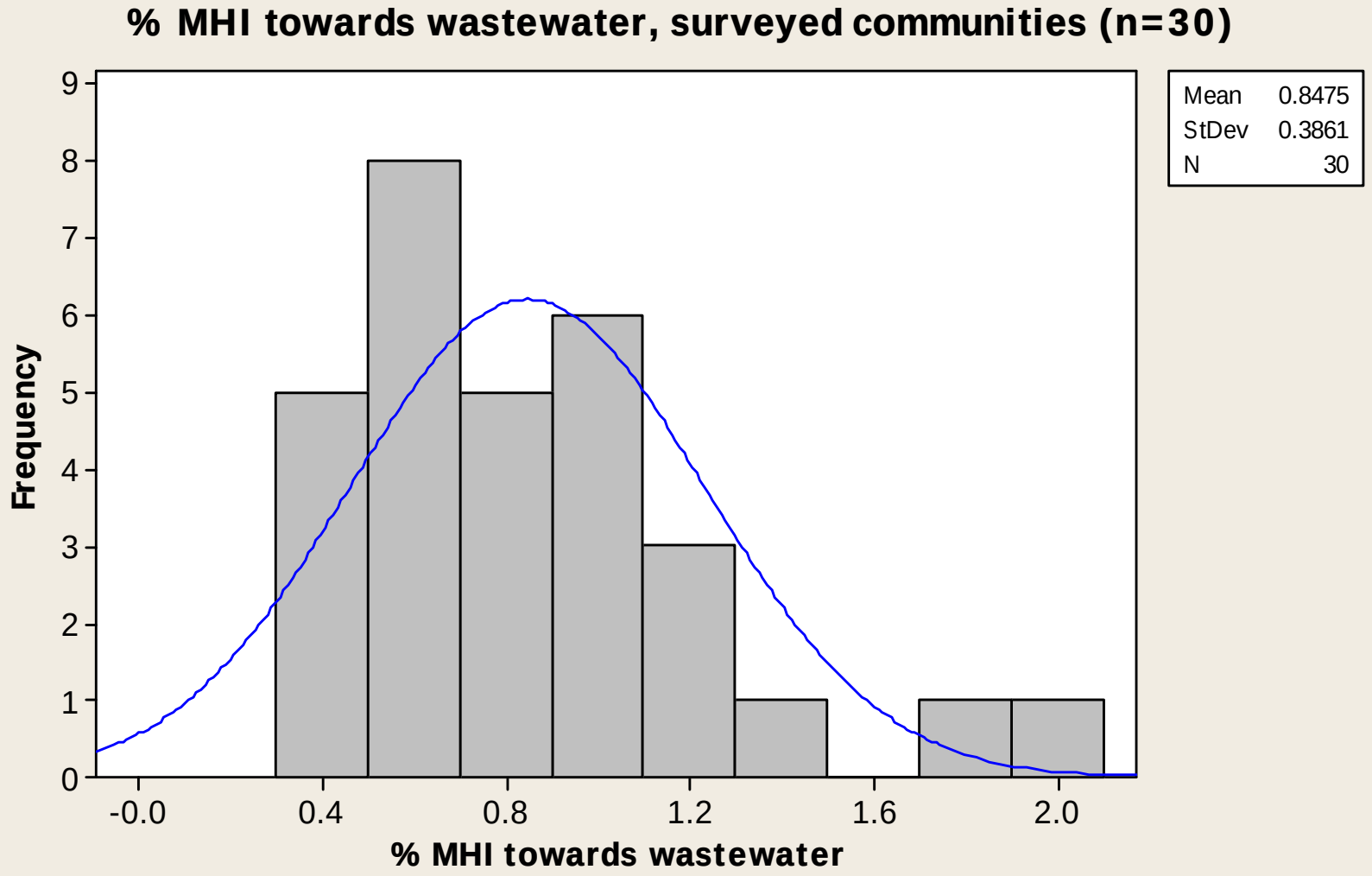
- Public WWTPs have to upgrade to meet nutrient standards-about 135 out of 200 total WWTPs
- In most cases, towns will hit limits of affordability
- In a few cases, larger cities will hit limits of technology (LOT)
- Difference between current rates and affordability limit (or LOT) is the public cost of nutrient compliance, which is paid for by sewer rate payers over avg. 20 years

Costs—Quantifiable: Public Sector (cont.)

- Out of 200 towns, 60 do not discharge from their WWTP and would not have to comply (thus, no cost for those towns)
- Another 3 or 4 discharge to a lake or land app
- 135 towns discharge, and those 135 would have to comply with Nutrient standards
- Used affordability limits on all 135 towns (even large cities) to estimate cost difference between current payment and those limits
- 135 total towns for a total estimate of $39.8 million more in annual costs than they face now

$39.8 M Costs—Quantifiable: Public Sector (cont.)

- Technically infeasible at this point to gather info on all towns. For minority of towns (30), current sewer rates and discharge rates are known.
- For towns where these numbers unknown, we used the distribution of values from the 30 towns as a basis for assigning values to towns we don't know
- Histogram of the 30 representative towns
- Randomly assigned values to unknown towns (105) of current rates as a % of MHI and flow % from histogram of towns we do know
- Assumptions
  - If WWTP discharge > 50% of flow, 1.4% of MHI
  - If WWTP discharge < 50% of flow, 1.0% of MHI


% MHI towards wastewater, surveyed communities (n=30)
Mean 0.8475
StDev 0.3861
N 30
Frequency
0
1
2
3
4
5
6
7
8
9
-0.0
0.4
0.8
1.2
1.6
2.0
% MHI towards wastewater

Other Costs-Non Quantifiable

- Private sector costs unknown, but will likely be tens of millions of dollars
  - Smurfit Stone $53 Million (recently shut down)
  - Refinery $11 Million
- Each company is unique, and costs to each are currently unknown
- Administration costs
- Other costs
- Non monetary—Opportunity costs

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Conclusions

- Monetary costs of meeting nutrient standards are much greater than monetary benefits
- Overall Benefits and Costs are cloudy-Lack of data problem
- A variety of ecosystem and non-monetary benefits are hard to quantify
- Monetary decision versus policy decision—Policy values are human values that are codified
- Value systems that incorporate water quality and aesthetics come at a cost